amended to improve form. No new matter is being presented, and approval and entry are respectfully requested.

The Objection to the Drawings

In item 1 on page 2 of the Office Action, the Examiner objected to Figure 4 for not including a legend such as --Prior Art--. Applicants provide a proposed drawing correction in red ink for Figure 4 with this response, including an accompanying Letter to the Examiner Requesting Approval of the Changes to the Drawings. Accordingly, Applicants respectfully request withdrawal of the objection to the drawings.

Objection To The Abstract

In item 2 on page 2 of the Office Action, the Examiner objected to the abstract for the reasons set forth therein. In view of the attached proposed amended abstract, the objection to the abstract should be resolved.

Objections to the Claims

In item 2 on page 2 of the Office Action, the Examiner objected to claim 13 because of a misspelled word. In view of the attached claim amendments, the objection to claim 13 should be resolved. Accordingly, Applicants respectfully request withdrawal of the objection to claim 13.

Claim Rejections Under 35 U.S.C. § 112

In items 4 and 5 on pages 2 and 3 of the Office Action, the Examiner rejected claim 8 under 35 U.S.C. § 112, first paragraph, as not being enabling. Also, in items 6 and 7 on page 3 of the Office Action, the Examiner rejected claim 8 under 35 U.S.C. § 112, second paragraph, as being indefinite.

The specification has been amended at page 5, line 3 and at page 22, line 20 to indicate the correct equation. Referring to FIG. 5, for example, of the present application, i indicates the i-line (λ = 365 nm), h indicates the h-line (λ = 405 nm), and g indicates the g-line (λ = 436 nm). See page 18, lines 7-9 of the specification. The working wavelength region extends from the g-line to the i-line, $\Delta\lambda$ is the width of the working wavelength region, and λ is a center wavelength of the working wavelength region. See page 18, lines 17-19 and page 22, lines 21-23 of the specification. Thus, it is obvious to one of skill in the art that $0.05 \leq \Delta\lambda / \lambda$ to achieve the results shown in FIG. 5. Accordingly, Applicants respectfully request withdrawal of the rejection to claim 8 under § 112.

Rejections Under 35 U.S.C. § 102

In items 8 and 9 on pages 3 and 4 of the Office Action, the Examiner rejected claims 1-4 and 8-12 under 35 U.S.C. § 102(e) as being anticipated by Tei et al. (U.S. Patent No. 6,292, 616). Applicants respectfully traverse these rejections for the reasons presented below.

Claim 1 of the present invention specifies, as amended, an optical apparatus comprising a suppressor to suppress the wavelength dependence of a thin film form on an optical surface of the optical apparatus, wherein the suppressor increases reflectance on a short wavelength side of a working wavelength region and decreases reflectance on a long wavelength side of the working wavelength region, and light rays incident on the optical surface include normal incident rays and oblique incident rays. The present invention provides an optical apparatus capable of achieving good energy transfer characteristics in the entire visual field, or in the entire illumination field, for light of a wide wavelength region.

The Tei reference relates to an optical attenuator for attenuating the intensity of incident light by a specific amount (Tei at col. 1, lines 6-8). The attenuator includes a flat attenuator plate 10 (optical attenuator) with a transparent glass substrate 11 that has a tapered shape (Tei at col. 3, lines 4-24 and FIGs. 1 and 2(a) to 2(c)). Antireflection coatings 12a and 12b are applied to both sides of the glass substrate 11, and a metal film 13 is formed on one of the sides of the glass substrate 11 (Tei at col. 3, lines 25-30). The antireflection coatings 12a and 12b compensate for wavelength dependence of attenuation factor due to the metal film 13, and the antireflection coatings 12a and 12b have the reverse characteristic of the dependence of the

metal film 13 on wavelength in the operating wavelength range (Tei at col. 1, lines 51-58). In other words, the antireflection coatings 12a and 12b have an opposite wavelength dependence as to that of the metal film 13 to cancel the wavelength dependence of the metal film 13.

Tei merely discloses an optical attenuator that attenuates the intensity of light to a predetermined extent. Further, referring to FIG. 2(c) of Tei, because the antireflection coatings 12a and 12b have a transmissive distribution that has a reverse characteristic as to the transmissivity of the metal film 13 to attenuate light, the attenuator of Tei cannot increase reflectance on a short wavelength side of a working wavelength region and decrease reflectance on a long wavelength side of the working wavelength region, as claimed in claim 1 of the present invention. In addition, Tei only discloses incident light that is normal to the attenuator plate 10. Tei does not consider oblique incident light. Thus, Tei cannot provide an optical apparatus capable of achieving good energy transfer characteristics in the entire illumination field.

Therefore, it is submitted that claim 1 patentably distinguishes over the Tei reference. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under § 102.

Rejections Under 35 U.S.C. § 103(a)

In item 11 on pages 4 and 5 of the Office Action, the Examiner rejected dependent claims 5-8 under 35 U.S.C. § 103(a) as being unpatentable over the Tei reference. Also, in item 12 on pages 5 and 6 of the Office Action, the Examiner rejected claims 9-20 under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto (U.S. Patent No. 6,051,842). Applicants respectfully traverse these rejections for the reasons presented below.

Claims 9, 12, 13, and 18 relate to an exposure apparatus or an exposure method that transfers a predetermined pattern formed on a mask onto a workpiece, wherein a suppressor suppresses wavelength dependence of a thin film formed on an optical surface arranged in an optical path between a light source and the mask.

The Federal Circuit has required that it is necessary to provide evidence of a suggestion, teaching or motivation to combine the teachings of the prior art. Even though this motivation

may come from the knowledge of one of ordinary skill in the art, there must be evidence of such knowledge. In re Dembiczak, 50 USPQ 2nd 1614, 1617 (Fed. Cir. 1999). Also, the factual inquiry of whether to combine references must be based on objective evidence of record. In re Lee, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002).

Yamamoto and Tei relate to different technical fields and solve different problems. Tei relates to an optical attenuator that suppresses wavelength dependence, but does not teach or suggest transferring a predetermined pattern formed on a mask onto a workpiece. Yamamoto relates to an illumination optical apparatus with a projection optical system between a reticle and an exposure surface (substrate) to project an image of the reticle pattern on the reticle onto the substrate, but does not teach or suggest an optical attenuator that suppresses wavelength dependence. Thus, there is no specific teaching or suggestion in either Yamamoto or Tei to combine the references.

Further, the Examiner's reason for combining references, as provided on page 6 of the Office Action, is that the quality of the exposure apparatus will be improved. However, there is no suggestion in either Yamamoto or Tei that suppressing wavelength dependence will improve the quality of an exposure apparatus. Applicant submits that an argument can always be made that combining references would enhance or improve a certain feature because the claimed invention typically produces a benefit or improvement. However, the Examiner "can satisfy the burden of obviousness in light of combination 'only by showing some objective teaching [leading to the combination].'" In re Dembiczak, 50 USPQ2d 1614, 1617 (CAFC 1999), *quoting* In re Fritch, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992).

Thus, Applicants respectfully submit that there is no motivation to combine the cited references. That is, there is no teaching or suggestion in the references to modify Yamamoto by including an optical attenuator that suppresses wavelength dependence. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under § 103.

Dependent Claims

The dependent claims depend from the above-discussed independent claims and are patentable over the prior art for the reasons discussed above. The dependent claims also recite additional features not taught or suggested by the prior art. For example, claim 6 recites "the

wavelength characteristic of the reflectance of the suppressor has a first region in which the first derivative of the wavelength characteristic is positive on the short wavelength side of the working wavelength region, and a second region in which the second derivative of the wavelength characteristic is negative on the longer wavelength side of the first region." Because the antireflection coatings 12a and 12b have a transmissive distribution that has a reverse characteristic as to the transmissivity of the metal film 13 to attenuate light, the attenuator of Tei cannot provide nor does it suggest the features of claim 6.

Therefore, for at least this reason and the reasons set forth above with respect to the independent claims, it is submitted that the dependent claims patentably distinguish over the prior art.

New Claims

Claims 21-27 are newly added with this response to alternatively define the present invention. Independent claim 21 specifies an optical apparatus having a suppressor that suppresses the wavelength dependence of a thin film formed on a curved optical surface. In contrast, the antireflection coatings 12a and 12b in the Tei reference are formed on a flat plate surface. Claims 22-26 depend from claim 21 and should be allowable for at least the reasons discussed above.

CONCLUSION

It is submitted that neither of the references, either taken alone or in combination, teaches the present claimed invention. Thus, claims 1-4 and 6-27 are deemed to be in a condition suitable for allowance. Reconsideration of the claims and an early Notice of Allowance are earnestly solicited.

If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

Finally, if there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 11/22/02

By: C. Joan Gilsdorf
Christine Joan Gilsdorf
Registration No. 43,635

700 Eleventh Street, NW, Suite 500
Washington, D.C. 20001
(202) 434-1500

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

Please **AMEND** the specification as follows:

Please AMEND the paragraph beginning at page 5, line 1 as follows:

--In the optical apparatus of the present invention, it is preferable to satisfy the following relation:

$$0.05 \leq \Delta\lambda / \lambda \quad (1),$$

where λ is a center wavelength of the predetermined wavelength band and $\Delta\lambda$ is a width of the predetermined wavelength band. In this case, the width $\Delta\lambda$ of the predetermined wavelength band is further preferably not less than 10 nm.--

Please AMEND the paragraph beginning at page 22, line 18 as follows:

In the present embodiment, it is preferable to satisfy the following relation:

$$0.05 \leq \Delta\lambda / \lambda \quad (1),$$

where λ is a center wavelength of the working wavelength region as the predetermined wavelength band and $\Delta\lambda$ is a width of the working wavelength region.

IN THE ABSTRACT

Please **DELETE** the existing Abstract and substitute therefore the following Abstract.

--An optical apparatus having a suppressor that suppresses the wavelength dependence, in a predetermined wavelength band, of a thin film formed on an optical surface of the optical apparatus.--

IN THE CLAIMS

Please **CANCEL** claim 5.

Please **AMEND** the following claims:

1. (ONCE AMENDED) An optical [Optical] apparatus, comprising:

an optical surface;

[in which] a thin film [with] having an optical characteristic [having] of wavelength dependence, which is formed on [an] the optical surface; and[,]

[said optical apparatus comprising]a suppressor arranged in an optical path of the optical apparatus to suppress [said] the wavelength dependence in a predetermined wavelength band,

wherein the suppressor has a reflectance characteristic of increasing reflectance on a short wavelength side of a working wavelength region and decreasing reflectance on a long wavelength side of the working wavelength region, and light rays incident on the optical surface include normal incident rays and oblique incident rays .

2. (ONCE AMENDED) The optical [Optical] apparatus according to [Claim] claim 1, wherein [said] the suppressor is formed on another optical surface different from [said] the optical surface in [said] the optical apparatus.

3. (ONCE AMENDED) The optical [Optical] apparatus according to [Claim] claim 2, wherein [said] the suppressor is a thin film laid on [said another] the other optical surface.

4. (ONCE AMENDED) The optical [Optical] apparatus according to [Claim] claim 1, wherein [said] the optical characteristic of [said] the thin film is one of [the] reflectance and [the] transmittance.

6. (ONCE AMENDED) The optical [Optical] apparatus according to [Claim] claim 1, wherein the wavelength characteristic of the reflectance of [said] the suppressor [is a characteristic having] has a first region in which the first derivative of the wavelength characteristic is positive[,] on the short wavelength side of the working wavelength region, and a

second region in which the second derivative of [said] the wavelength characteristic is negative[, in a second region] on the longer wavelength side of [said] the first region.

7. (ONCE AMENDED) The optical [Optical] apparatus according to [Claim] claim 6, wherein [said] the predetermined wavelength band is defined between [said] the first region and the second region.

9. (ONCE AMENDED) An exposure [Exposure] apparatus for transferring a predetermined pattern, formed on a mask under illumination, onto a [work] workpiece, [said] the exposure apparatus comprising the optical apparatus [as set forth in Claim] of claim 1.

10. (ONCE AMENDED) The exposure [Exposure] apparatus according to [Claim] claim 9, further comprising a light source for supplying illumination light,

wherein [said] the light source supplies the illumination light including at least two bright lines, and

wherein [said] the at least two bright lines are in [said] the predetermined wavelength band.

11. (ONCE AMENDED) The exposure [Exposure] apparatus according to [Claim] claim 9, further comprising an illumination optical system for illuminating [said] the mask, based on illumination light from a light source, and a projection optical system for forming an image of the pattern of [said] the mask on the [work] workpiece,

wherein [said] the suppressor is provided in at least [either] one of [said] the illumination optical system and [said] the projection optical system.

12. (ONCE AMENDED) An exposure method of transferring a predetermined [wherein said] pattern formed on [said] a mask [is transferred] onto [said work by use of] a workpiece, using the exposure apparatus [as set forth in Claim] of claim 9.

13. (ONCE AMENDED) An exposure apparatus for transferring a predetermined pattern, formed on a mask under illumination, onto a workpiece, comprising:

a light source;

an illumination optical system arranged in an optical path between [said] the light source and [said] the mask;

a projection optical system arranged in an optical path between [said] the mask and [said] the workpiece;

a thin film[, with] having an optical [charatcteristic having] characteristic of wavelength dependence, the thin film being formed on an optical surface arranged in at least one of [said] the optical paths; and[,]

a suppressor, arranged in at least one of [said] the optical paths, to suppress [said] the wavelength dependence in a predetermined wavelength range.

14. (ONCE AMENDED) The exposure apparatus according to claim 13, wherein [said] the suppressor is formed on another optical surface different from [said] the optical surface in [said] the at least one of [said] the optical paths.

15. (ONCE AMENDED) The exposure apparatus according to claim 14, wherein [said] the suppressor is a thin film laid on [said another] the other optical surface.

16. (ONCE AMENDED) The exposure apparatus according to claim 15, wherein [said] the optical characteristic of the thin film is one of [the] reflectance and [the] transmittance.

17. (ONCE AMENDED) The exposure apparatus according to clam 13, wherein [said] the predetermined wavelength range includes a wavelength of an illumination light.

18. (ONCE AMENDED) An exposure method of transferring a predetermined pattern, formed on a mask under illumination, onto a workpiece, comprising[the steps of]:

providing a light from a light source; illuminating [said] the mask with [said] the light from the light source;

projecting [said] the pattern on [said] the mask onto [said] the workpiece;

passing the light through a thin film with an optical characteristic having wavelength dependence; and[,]

passing the light through a suppressor,

wherein [said] the thin film is formed on an optical surface in an optical path between [said] the light source and [said] the workpiece, and

wherein [said] the suppressor suppresses [said] the wavelength dependence in a predetermined wavelength range.

19. (ONCE AMENDED) The method according to claim 18, wherein [said] the predetermined wavelength range includes a wavelength of an illumination light.

20. (ONCE AMENDED) The method according to claim 18, wherein [said] the optical characteristic of the thin film is one of [the] reflectance and [the] transmittance.

Please **ADD** the following new claims:

21. (NEW) An optical apparatus, comprising:

a curved optical surface;

a thin film with an optical characteristic having wavelength dependence, the thin film being formed on the curved optical surface; and

a suppressor arranged in an optical path of the optical apparatus, the suppressor suppressing the wavelength dependence in a predetermined wavelength band.

22. (NEW) The optical apparatus according to claim 21, wherein the suppressor is formed on another optical surface different from the curved optical surface in the optical apparatus.

23. (NEW) The optical apparatus according to claim 22, wherein the other optical surface has a curved optical surface.

24. (NEW) The optical apparatus according to claim 23, wherein the suppressor is a thin film laid on the other optical surface.

25. (NEW) The optical apparatus according to claim 24, wherein the optical characteristic of the thin film is one of reflectance and transmittance.

26. (NEW) An exposure apparatus for transferring a predetermined pattern, formed on a mask under illumination, onto a workpiece, comprising the optical apparatus according to claim 21.

27. (NEW) The exposure apparatus according to claim 13, wherein the optical surface has a curved optical surface.